

in Europe "after the last great extension of glaciers"—or in the Post-glacial times.

There is also reason to believe that man was living in Europe before and during the Glacial period, or, in other words, in Pre-glacial, Glacial, and Inter-glacial times, although the alleged discovery of man in the Victoria Cave, relied upon by Dr. J. Geikie, has been shown to have been founded on a mistake, and the interglacial age of the implements at Brandon and Thetford, which he quotes as being of great importance, is not accepted by very good judges such as Dr. Evans and Prof. Hughes. These however may be dismissed as throwing no light on the question as to the existence of man in Britain after the great extension of the glaciers.

Dr. J. Geikie's method of arriving at the climate of his "Inter-glacial periods" is equally faulty. He considers that they were warm and genial, because of the presence of certain land shells, such as *Cyrena fluminalis*, the climatic value of which is at present unknown, of certain marine shells, the distribution of which is dependent on the warm and cold currents, and of land-mammalia now found only in southern latitudes, such as the hippopotamus, the limit of whose endurance of cold is yet to be proved, since those in the Zoological Gardens in London will take their tubs in frosty weather. But, unfortunately for his argument, the last animal is associated with arctic species, such as the reindeer, in all the caves (Kirkdale, Durdham Down, &c.) except two, and in all the river deposits (Bedford, Acton, &c.) except some three or four, in which it has been found in this country. With equal reason we might argue that the climate was arctic from the presence of reindeer. The consideration which he urges, that the two groups of animals could not live side by side because they do not live now, is met by the direct testimony of their associated remains, not merely in this country but on the continent. The hyænas, for example, of Kirkdale and of the Vale of Clwyd ate reindeer and hippopotamuses, and dragged them into their dens, where their gnawed fragments occurred in one and the same stratum. We may remark that in dealing with the fauna of the Victoria Cave Dr. J. Geikie omits all notice of the reindeer, the presence of which destroys his argument as to climate. This selection may be taken as a fair sample of the mode in which he has dealt with the whole evidence offered by the Pleistocene mammalia. He deals with it, not with the impartiality of a judge, but as an advocate; and has only called those witnesses which count on his side. The vast numbers of reindeer associated with the remains of Palæolithic man from the caves of Cresswell as far as the Alps, and from the Pyrenees into the valley of the Danube, prove that the climate in those regions was in those times not "a warm inter-glacial" climate, but one in harmony with that indicated by the blocks of stone in the gravels pointed out by Prof. Prestwich.

The interglacial net is spread far and wide over the Continent. It includes not merely the forest with fig-trees and Judas-trees and laurestinas of Moret, which, as Saporta points out, would have been killed off by a spell of hard frosts, to say nothing of such a climate as is implied by the supposed preceding Glacial period, of which there is no evidence in that locality. It covers the deposits of Mont Perrier, near Issoire, from which MM.

Croizet and Jobert obtained a rich fauna, universally considered typical upper Pleiocene. It covers also the mammaliferous deposit of Liffe, near Gandino in the Italian Alps, in which the mammalia identified by Forsyth Major are unmistakably Pleiocene. It is even stretched so as to take in the so-called Pleiocene man of Olmo, near Arezzo, the age of which, as Dr. Evans has pointed out, is proved to be Neolithic by the associated implements. Thus we have things of widely different and of well-ascertained age grouped together under the head of "interglacial," and we have in this fact proof that the classification is so far worthless, as indeed every system must be which is based on ice, and ice only.

In further illustration of this we may quote the view of our author, that in the period usually termed Prehistoric, or recent, but by him "Post-glacial," Europe was connected by land with the Faröes, Iceland, and Greenland, and that the climate was genial. It is assumed that the "last glacial period" killed off all the Pleistocene forests in those latitudes, and that the present traces of forests are the result of subsequent growths, extending from one point to all the rest along a continuous tract of land. If we allow this, surely in the far north, to say the least, they are "interglacial," seeing that they are wedged in between "the last Glacial period" and the present glacial conditions. But we can allow neither his assumption nor can we accept his geography. The Post-glacial glaciers of Scotland spoken of on p. 526 seem to us proof that the ice-classification breaks down, and the admission that the Great Ice age is merely "a stage or phase of the Pleistocene period" is a frank confession tending in that direction.

It is only necessary to say a few words about the two large volumes of the Marquis de Nadaillac. His attitude of reserve with regard to Miocene and Pleiocene man is judicial and impartial. But we would point out that here and there in the work serious errors are to be remarked. He considers, for example, the Archæopteryx a tertiary bird; he associates the Liassic fish of Lyme Regis with the "Tertiary fishes of Lebanon and Monte Bolca," and he writes of the Ichthyosaurus and Plesiosaurus as if they belonged to the Eocene age.

In neither of these works can we find any addition to what has been already known about Prehistoric Europe, and in both there are omissions of well-known facts which it is impossible to notice within the limits of these columns.

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#### THE BIOLOGY OF PLANTS

*Beiträge zur Biologie der Pflanzen.* Herausgegeben von Dr. Ferdinand Cohn. Vol. ii. part 3, with 5 plates; vol. iii. parts 1 and 2, with 15 plates. (Breslau: J. U. Kern, 1877, 1879, and 1880.)

IN the concluding part of the second volume of the well-known *Beiträge* three out of four papers are devoted to fungi and Bacteria, one only being physiological. This physiological paper is by Dr. Just, on the action of high temperatures upon the preservation and germination of seeds. The experiments, which are described in minute detail, were made with Nobbe's germinating apparatus and a thermostat. Horstmann's thermostat, which was the one employed for all tempera-

tures up to 60° C., is described and figured at p. 348, and consists essentially of a closed vessel with triple walls, the space between the inner and middle plate filled with water, the outer containing air. For higher temperatures a simple tin plate thermostat was employed, the space being filled with water for temperatures up to 100° Cent. and with glycerine or oil for higher temperatures. The source of heat was always a gas-flame with the usual thermo-regulator. Numerous tabulated results are given of experiments upon moist and dry seeds at various temperatures, and it was found, as might be anticipated, that perfectly dry seeds can withstand a high temperature, even between 120° and 125° Cent., without injury.

Dr. Koch describes how bacteria can be observed, prepared, and photographed, this paper forming the sixth of the extremely important series of researches on bacteria which have from time to time appeared in the *Beiträge*. A thin layer of bacteria with the fluid containing them is to be dried on a thin cover of glass. By placing the glass cover with the dried material in absolute alcohol, or better, in a 0.5 per cent. solution of chromic acid, the bacteria are fixed to the cover, although the coagulated ground substance in which the bacteria are imbedded can be made to swell up and the bacteria themselves to resume their natural forms when the cover is placed in a solution of acetate of potash (1 part to 2 of distilled water). The bacteria can be coloured by means of aniline, the best of all being aniline brown; but methyl violet and fuchsin will also answer. The stained object can be preserved permanently on slides by mounting in Canada balsam, concentrated solution of acetate of potash, or in glycerine. Twenty-four photographs of bacteria, mostly from specimens stained with aniline brown, illustrate the paper; and in some, as 5 and 6 on Plate XIV., the cilia of bacillus are very beautifully shown, magnified 500 and 700 diameters. Koch finds that it is easier to photograph the cilia than to observe them directly with the microscope.

The other papers in this part are on certain Ustilaginæ, by Dr. Schroeter; and on two new species of Entomophthora (*E. conglomerata* and *E. rimosa*) discovered upon dead gnats, by Prof. N. Sorokin.

The first and second parts of vol. iii. contain eleven papers. Four of these are devoted to Bacteria, and form the seventh to the tenth of the series of Researches on Bacteria already alluded to. The titles of the papers are VII. Experiments on Infection with *Micrococcus prodigiosus*, by Dr. A. Wernich; VIII. Researches on the Bacteria in Air, by Dr. Miflet; IX. On the Action of the Electrical Current on the Multiplication of Bacteria, by Dr. F. Cohn and Dr. Mendelssohn; and X. Studies of Blue Milk, by Dr. F. Neelsen. Two of these papers may be briefly mentioned. By means of a specially contrived apparatus fitted with a new continuous aspirator, the invention of Paul Boehme in Brunn, atmospheric air from different localities was examined. These were (1) air in Botanical Laboratory; (2) in Fever Hospital; (3) in the Pathological Theatre; (4) in the Surgical Theatre; (5) air in Botanic Garden; (6) air for soil; and (7) air for drains. The results were briefly as follows:—1. Germs of bacteria capable of developing are abundant in the air, and could readily be collected and cultivated in a special mineral solution, malt extract, or solution of Liebig's

extract of beef. 2. Many forms of bacteria can produce reproductive germs in air, while others, as *B. Termo*, seem only capable of producing germs in putrescent matter. 3. Air from the soil contained occasionally germs of bacteria. 4. Air from the Fever Hospital contained no germs, owing to the completeness of the ventilation and disinfection. 5. Air from a sewer contained abundance of germs of bacteria capable of reproducing.

Neelsen, in his paper on Blue Milk, finds that the special organism in it may assume three or four different forms, sometimes like Bacterium, then like Bacillus, then like a Chroococcus, and lastly like a Leptothrix. He discusses the Theory of Cohn and others that the Bacteria form many separate genera and species, and the Theory of Lankester and Warming, that they are forms of a protean species, and seems to conclude that the germs of a given form may under different conditions develop in one or other direction, as observed by him in blue milk.

Dr. Schroeter continues his observations on the Development of Rust, and Dr. Oscar Kirchner describes the Development of *Volvox minor*, Stein. Dr. Hiesher describes the Anatomy and Biology of the Genus Streptocarpus, and details many interesting facts regarding that curious and beautiful genus. When the seed of *Streptocarpus polyanthus* germinates, numerous adventitious roots form on the primary axis, one of the two cotyledons soon disappears, while the other develops greatly, and forms a perennial foliage leaf. On the petiole of this leaf numerous adventitious roots develop and the primary axis disappears. The leaf produces adventitious buds from which the flowers develop, while it also develops a series of adventitious leaf-buds. Dr. Beinling contributes a paper on the formation of adventitious roots and buds on the leaf-cuttings of Peperomia. Prof. Klein describes in detail the anatomy of *Pinguicula alpina* as an insectivorous plant, and points out that the plant occurs in two forms, one with green leaves, the other with the leaves more or less red-brown in colour, and that the tissues assume an intense yellow colour when acted on with caustic potash solution. The remaining papers are by Dr. Schwartz, Chemico-botanical Studies on the Acids in Lichens, and Dr. Eidam on the Gymnoasci. The various papers ably sustain the reputation of this work, and all of them will well repay careful study.

#### LETTERS TO THE EDITOR

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The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

#### Dust and Fogs

I MUCH regret the Hon. R. Russell, in his letter to NATURE, vol. xxiii. p. 267, takes such an extremely desponding view of the influence which my experiments on cloudy condensation are likely to exercise upon the present attempts to rid the atmosphere of our large towns of their ever-recurring fogs. The object of these experiments was to find out what caused fogs, in the hope that with the knowledge thus acquired we might be better able to find a remedy. The preferable course seemed to be to find the cause first, and then if possible devise some remedy, rather than try remedies at haphazard.